AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application. Please amend Claims 1-2, 5, 10, 18, 21, 38, 40, 41, 43, 46, and 51 as follows:

1. (Currently Amended) A locomotive, comprising:

a plurality of ~~direct current~~ traction motors corresponding to a plurality of axles and a plurality of drive switches;

a plurality of free-wheeling bypass circuits, each bypass circuit bypassing a corresponding one of the plurality of plurality of drive switches; and

a controller operable to (a) determine the power requirement for each motor at each of a number of successive time intervals; (b) determine the necessary voltage and pulse width to achieve the desired power for each motor; and (c) sequentially pulse power to each of the motors for a duration necessary to achieve the power requirement at each successive time interval, wherein, during a selected time interval, a first traction motor receives a first power pulse and a second different traction motor receives a second power pulse and wherein the first and second power pulses are different.

2. (Currently Amended) The locomotive of claim 1, further comprising:

a plurality of chopper circuits corresponding to the plurality of direct current traction motors, each chopper circuit comprising a respective free-wheeling bypass circuit and drive switch in electrical communication with a respective ~~direct current~~ traction motor.

3. (Original) The locomotive of claim 2, wherein, in a first mode, at least most of the electrical current passing through the chopper circuit passes through the corresponding free-wheeling bypass circuit and the corresponding traction motor and bypasses the corresponding drive switch and, in a second mode, at least most of the electrical current

passing through the chopper circuit passes through the corresponding drive switch and traction motor and bypasses the corresponding free-wheeling bypass circuit.

4. (Original) The locomotive of claim 3, wherein, during a selected time interval, a first chopper circuit corresponding to a first traction motor is in the first mode and a second chopper circuit corresponding to a second traction motor is in the second mode.

5. (Currently Amended) The locomotive of claim 1, wherein each free-wheeling bypass circuit comprises a free-wheeling gate, and wherein the traction motors are direct current traction motors.

6-7. (Canceled)

8. (Previously Presented) The locomotive of claim 1, wherein the first and second power pulses are nonoverlapping.

9. (Original) The locomotive of claim 8, wherein, when the first traction motor receives the first power pulse, the second traction motor receives no power pulse and, when the second traction motor receives the second power pulse, the first traction motor receives no power pulse.

10. (Currently Amended) A method for operating a locomotive, comprising:

providing a plurality of ~~direct current~~ traction motors corresponding to a plurality of axles and at least one chopper circuit, the at least one chopper circuit comprising a corresponding drive circuit, the drive circuit including a corresponding drive switch and being in electrical communication with a corresponding one or more of the plurality of traction motors, and a corresponding free-wheeling bypass circuit, the bypass circuit bypassing the

corresponding drive switch, wherein, in a first mode, at least most of the electrical current passing through the corresponding chopper circuit passes through the corresponding free-wheeling bypass circuit and corresponding one or more of the plurality of traction motors and bypasses the corresponding drive switch and, in a second mode, at least most of the electrical current passing through the corresponding chopper circuit passes through the corresponding drive switch and the corresponding one or more traction motors and bypasses the corresponding free-wheeling bypass circuit; and

simultaneously operating at least one of the traction motors in the first mode and a different at least one of the traction motors in the second mode.

11. (Original) The method of claim 10, wherein the corresponding at least one chopper circuit includes a plurality of respective chopper circuits corresponding to the plurality of direct current traction motors, each chopper circuit comprising a corresponding free-wheeling bypass circuit and drive switch in electrical communication with a respective direct current traction motor.

12. (Original) The method of claim 10, wherein each free-wheeling bypass circuit comprises a free-wheeling gate.

13. (Previously Presented) The method of claim 10, further comprising:

determining the power requirement for each motor at each of a number of successive time intervals;

determining the necessary pulse width to achieve the desired power for each motor; and

sequentially pulsing each of the motors for a duration necessary to achieve the power requirement at each successive time interval.

14. (Previously Presented) The method of claim 13, wherein, during a selected time interval, a first traction motor receives a first power pulse and a second different traction motor receives a second power pulse and wherein the first and second power pulses have differing magnitudes.

15. (Original) The method of claim 14, wherein the first and second power pulses are nonoverlapping.

16. (Original) The method of claim 15, wherein, when the first traction motor receives the first power pulse, the second traction motor receives no power pulse and, when the second traction motor receives the second power pulse, the first traction motor receives no power pulse.

17. (Original) The method of claim 13, wherein power is cut and then restored to a first motor, while maintaining at least substantially constant power to the remaining motors, to correct loss of traction on the first motor.

18. (Currently Amended) The method of claim 13, wherein over-current protection for each individually controlled motor is provided, and wherein the traction motors are direct current traction motors.

19. (Previously Presented) The method of claim 13, wherein power is also provided to all of the plurality of motors constantly at reduced pulse width during selected intervals.

20. (Original) The method of claim 13, wherein said power is sequentially pulsed using a pulse width modulation device.

21. (Currently Amended) The locomotive of claim 1, wherein each of the plurality of drive switches is operable to pulse power sequentially to each of the traction motors to produce a selected power requirement for each traction motor during a selected time interval, wherein the pulse width is varied depending on a measured characteristic of the respective traction motor.

22. (Previously Presented) The locomotive of claim 21, wherein, for each motor, the frequency of pulses is maintained at least substantially constant and wherein the measured characteristic is at least one of revolutions per minute and electrical current.

23. (Previously Presented) The locomotive of claim 21, wherein the pulses to each of the traction motors are time sequenced such that a time separation between adjacent pulses to different traction motors is at least substantially maximized and wherein the measured characteristic is an electrical current supplied to each traction motor.

24. (Previously Presented) The method of claim 10, wherein the at least one chopper circuit is operable to pulse power sequentially to each of the traction motors to produce a selected power requirement for each traction motor during a selected time interval, wherein the pulse width is varied depending on the measured characteristic of the respective traction motor.

25. (Previously Presented) The method of claim 24, wherein, for each motor, the frequency of pulses is maintained at least substantially constant.

26. (Previously Presented) The method of claim 25, wherein the pulses to each of the traction motors are time sequenced such that a time separation between adjacent pulses to different traction motors is at least substantially maximized.

27-37. (Canceled)

38. (Currently Amended) A locomotive, comprising:

a plurality of ~~direct current~~ traction motors corresponding to a plurality of axles and a plurality of drive switches; and

a plurality of free-wheeling bypass circuits, each bypass circuit bypassing a corresponding one of the plurality of plurality of drive switches, wherein each of the plurality of drive switches is operable to pulse power sequentially to each of the traction motors to produce a selected power requirement for each traction motor during a selected time interval, wherein the pulse width is varied depending on a measured characteristic of the respective traction motor, wherein each of the plurality of drive switches is operable to pulse power sequentially to each of the traction motors to produce a selected power requirement for each traction motor during a selected time interval, wherein the pulse width is varied depending on a measured characteristic of the respective traction motor, wherein the pulses to each of the traction motors are time sequenced such that a time separation between adjacent pulses to different traction motors is at least substantially maximized, and wherein the measured characteristic is an electrical current supplied to each traction motor.

39. (Previously Presented) The locomotive of claim 38, further comprising:

a controller operable to (a) determine the power requirement for each motor at each of a number of successive time intervals; (b) determine the necessary voltage and pulse width to achieve the desired power for each motor; and (c) sequentially pulse power to each of the motors for a duration necessary to achieve the power requirement at each successive time interval, wherein, during a selected time interval, a first traction motor receives a first power pulse and a second different traction receives a second power pulse and wherein the first and second power pulses have differing magnitudes.

40. (Currently Amended) The locomotive of claim 38, further comprising:

a plurality of chopper circuits corresponding to the plurality of ~~direct current~~ traction motors, each chopper circuit comprising a respective free-wheeling bypass circuit and drive switch in electrical communication with a respective ~~direct current~~ traction motor, wherein, in a first mode, at least most of the electrical current passing through the chopper circuit passes through the corresponding free-wheeling bypass circuit and the corresponding traction motor and bypasses the corresponding drive switch and, in a second mode, at least most of the electrical current passing through the chopper circuit passes through the corresponding drive switch and traction motor and bypasses the corresponding free-wheeling bypass circuit and wherein, during a selected time interval, a first chopper circuit corresponding to a first traction motor is in the first mode and a second chopper circuit corresponding to a second traction motor is in the second mode.

41. (Currently Amended) The locomotive of claim 39, wherein the first and second power pulses are nonoverlapping, and wherein the traction motors are direct current traction motors.

42. (Previously Presented) The locomotive of claim 41, wherein, when the first traction motor receives the first power pulse, the second traction motor receives no power pulse and, when the second traction motor receives the second power pulse, the first traction motor receives no power pulse.

43. (Currently Amended) A method for operating a locomotive, comprising:

providing a plurality of ~~direct current~~ traction motors corresponding to a plurality of axles and at least one chopper circuit, the at least one chopper circuit comprising a corresponding drive circuit, the drive circuit including a corresponding drive switch and being in electrical communication with a corresponding one or more of the plurality of traction

motors, and a corresponding free-wheeling bypass circuit, the bypass circuit bypassing the corresponding drive switch, wherein, in a first mode, at least most of the electrical current passing through the corresponding chopper circuit passes through the corresponding free-wheeling bypass circuit and corresponding one or more of the plurality of traction motors and bypasses the corresponding drive switch and, in a second mode, at least most of the electrical current passing through the corresponding chopper circuit passes through the corresponding drive switch and the corresponding one or more traction motors and bypasses the corresponding free-wheeling bypass circuit; and

during a selected time interval, operating at least one of the traction motors in the first mode and a different at least one of the traction motors in the second mode.

wherein the at least one chopper circuit is operable to pulse power sequentially to each of the traction motors to produce a selected power requirement for each traction motor during a selected time interval, wherein the pulse width is varied depending on the measured characteristic of the respective traction motor, wherein, for each motor, the frequency of pulses is maintained at least substantially constant, and wherein the pulses to each of the traction motors are time sequenced such that a time separation between adjacent pulses to different traction motors is at least substantially maximized.

44. (Previously Presented) The method of claim 43, further comprising:

determining the power requirement for each motor at each of a number of successive time intervals;

determining the necessary pulse width to achieve the desired power for each motor; and

sequentially pulsing each of the motors for a duration necessary to achieve the power requirement at each successive time interval.

45. (Previously Presented) The method of claim 44, wherein, during a selected time interval, a first traction motor receives a first power pulse and a second different traction receives a second power pulse and wherein the first and second power pulses have differing magnitudes.

46. (Currently Amended) The method of claim 45, wherein the first and second power pulses are nonoverlapping, and wherein the traction motors are direct current traction motors.

47. (Previously Presented) The method of claim 46, wherein, when the first traction motor receives the first power pulse, the second traction motor receives no power pulse and, when the second traction motor receives the second power pulse, the first traction motor receives no power pulse.

48. (Previously Presented) The method of claim 44, wherein power is cut and then restored to a first motor, while maintaining at least substantially constant power to the remaining motors, to correct loss of traction on the first motor.

49. (Previously Presented) The locomotive of claim 1, wherein the first and second pulses have different magnitudes.

50. (Previously Presented) The locomotive of claim 1, wherein the first and second power pulses have different widths.

51. (Currently Amended) [[the]]The locomotive of claim 38, wherein, for each motor, the frequency of pulses is maintained at least substantially constant, and wherein the measured characteristic is at least one of revolutions per minute and electrical current.